## Claims

1. A method for making a dielectric structure for dual-damascene applications, the method comprising:

providing a substrate;

forming a barrier layer over the substrate;

forming an inorganic dielectric layer over the barrier layer; and

forming a low dielectric constant layer over the inorganic dielectric layer.

2. A method for making a dielectric structure for dual-damascene applications as recited in claim 1, further comprising:

forming a trench in the low dielectric constant layer using a first etch chemistry.

3. A method for making a dielectric structure for dual-damascene applications as recited in claim 2, further comprising:

forming a via in the inorganic dielectric layer using a second etch chemistry, the via being within the trench.

4. A method for making a dielectric structure for dual-damascene applications as recited in claim 1, wherein the barrier layer is one of a silicon nitride layer and a silicon carbide layer.

5. A method for making a dielectric structure for dual-damascene applications as recited in claim 4, wherein the forming of the inorganic dielectric layer includes,

depositing a TEOS silicon dioxide material over the barrier layer.

6. A method for making a dielectric structure for dual-damascene applications as recited in claim 5, wherein the forming of the low dielectric constant layer includes,

depositing a carbon doped oxide.

7. A method for making a dielectric structure for dual-damascene applications as recited in claim 3, wherein the inorganic dielectric layer is one of a TEOS oxide layer and a fluorine doped oxide layer, and the low dielectric constant layer is a carbon doped oxide layer.

8. A method for making a dielectric structure for dual-damascene applications as recited in claim 7, wherein the first etch chemistry is optimized to etch through the carbon doped oxide layer and the second etch chemistry is optimized to etch through the TEOS oxide layer or the fluorine doped oxide layer.

9. A method for making a dielectric structure for dual-damascene applications as recited in claim 8, wherein the second etch chemistry is selective to the barrier layer.

10. A method for making a multi-layer inter-metal dielectric over a substrate, comprising:

forming a barrier layer over the substrate;

forming a silicon dioxide layer over the barrier layer;

forming a low dielectric constant layer over the silicon dioxide layer;

forming a trench through the low dielectric constant layer; and

forming a via in the trench extending to the barrier layer.

11. A method for making a multi-layer inter-metal dielectric over a substrate as recited in claim 10, wherein the barrier layer is one of a silicon nitride layer and a silicon carbide layer.

12. A method for making a multi-layer inter-metal dielectric over a substrate as recited in claim 11, wherein the forming of the silicon dioxide layer includes,

depositing one of an un-doped TEOS oxide layer and a fluorine doped oxide layer.

13. A method for making a multi-layer inter-metal dielectric over a substrate as recited in claim 12, wherein the forming of the low dielectric constant layer, includes,

depositing one of a carbon doped oxide layer and an organic dielectric layer.

14. A method for making a multi-layer inter-metal dielectric over a substrate as recited in claim 10, wherein forming the via in the trench extending to the barrier layer further includes,

implementing a first chemistry optimized to etch through the low dielectric constant layer; and

implementing a second chemistry optimized to etch through the silicon dioxide layer.

15. A method for making a multi-layer inter-metal dielectric over a substrate as recited in claim 14, wherein the second chemistry that is optimized to etch through the silicon dioxide layer is selective to the barrier layer.

16. A method for making a multi-layer inter-metal dielectric over a substrate as recited in claim 15, wherein the barrier layer is one of a silicon nitride layer and a silicon carbide layer.

17. A method of making a dielectric layer for use in dual-damascene applications, comprising:

providing a substrate;

depositing a barrier layer over the substrate; and

depositing a dopant varying oxide layer over the barrier layer, the depositing of the dopant varying oxide layer includes,

depositing in a chemical vapor deposition chamber an initial amount of un-doped oxide over the barrier layer;

introducing an increasing amount of carbon into the chemical vapor deposition chamber, such that a topmost portion of the dopant varying oxide layer has a lower dielectric constant than the initial amount of un-doped oxide.

18. A method of making a dielectric layer for use in dual-damascene applications as recited in claim 17, further comprising:

etching through the topmost portion of the dopant varying oxide layer with a first chemistry.

19. A method of making a dielectric layer for use in dual-damascene applications as recited in claim 18, further comprising:

etching through the initial amount of un-doped oxide of the dopant varying oxide layer with a second chemistry that is selective to the barrier layer.

20. A method of making a dielectric layer for use in dual-damascene applications as recited in claim 19, wherein the barrier layer is one of silicon nitride layer and a silicon carbide layer.

21. A multi-layer dielectric layer over a substrate for use in dual-damascene applications, comprising:

a barrier layer disposed over the substrate;

an inorganic dielectric layer disposed over the barrier layer; and

a low dielectric constant layer disposed over the inorganic dielectric layer;

wherein the inorganic dielectric layer is configured to receive metallization line trenches and the low dielectric constant layer is configured to receive vias during a dual-damascene process.

22. A multi-layer dielectric layer over a substrate for use in dual-damascene applications as recited in claim 21, wherein the barrier layer is one of a silicon nitride layer and a silicon carbide layer.

23. A multi-layer dielectric layer over a substrate for use in dual-damascene applications as recited in claim 22, wherein the inorganic dielectric layer is one of an un-doped TEOS oxide and a fluorine doped oxide.

24. A multi-layer dielectric layer over a substrate for use in dual-damascene applications as recited in claim 23, wherein the low dielectric constant layer is a carbon doped oxide.

25. A method of making a dielectric structure, comprising:

providing a substrate;

forming a barrier layer over the substrate;

forming a first dielectric layer over the barrier layer;

forming a second dielectric layer over the first dielectric layer; and

wherein said second dielectric layer has a different etch characteristic than the first dielectric layer.